Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims 1-42 (previously canceled)

43. (currently amended) A device comprising:

a first module configured to receive video images and to identify objects of interest in

response to the video images;

a second module coupled to the first module and configured to classify a plurality of

shape and posture categories based on a plurality of observed states of the

objects of interest; and

a third module coupled to the second module, wherein the third module is configured

to identify behaviors of the objects of interest ~~in response to~~ using the plurality

of shape and posture categories and ~~to characterize the behaviors of the objects~~

~~of interest in response to~~ standard object behaviors.

44. (previously presented) The device of claim 43, wherein the second module further

obtains feature information by tracking the objects of interest over a plurality of video

images.

45. (currently amended) The device of claim 44, wherein ~~the characterizing of the behaviors~~

~~of the objects of interest further includes~~ the third module is further configured to identify

behaviors of the objects of interest by comparing feature information of the objects of interest

with predefined categories exhibited by the standard object behaviors.

46. (currently amended) The device of claim 44, wherein ~~the characterizing of the behaviors~~ ~~of the objects of interest further includes identifying~~ the third module is further configured to identify at least one of eating, rearing, jumping, drinking, running, walking, chewing, grooming, hanging, cuddling, landing vertically, repetitively jumping, circling, sleeping, twitching, awakening, digging, foraging, sniffing, pausing, urinating, stretching, licking, scratching, spinning, sitting, standing, and lying ~~of the objects of interest~~.

47. (previously presented) The device of claim 43, wherein the first module is an object identification and segregation module that identifies and segregates predetermined types of objects from the video images.

48. (previously presented) The device of claim 47, wherein the second module further includes:

> an object tracking module configured to track the objects of interest in a series of
>> video image frames; and
> an object shape and posture classifier coupled to the object tracking module and
>> configured to provide the plurality of shape and posture categories.

49. (previously presented) The device of claim 48, wherein the third module includes a behavior identification module, which is coupled to a standard object behavior storage module.

50. (currently amended) A system for characterizing activity of objects comprising:

    a video camera;

    a video digitization unit; and

    a digital processing unit that includes:

        a device of claim 43; and

        a memory device.

51. (currently amended) A method of characterizing an activity comprising:

    obtaining a stream of video image frames from a monitoring device;

    identifying objects of interest from the stream of video image frames;

    providing feature information of the objects of interest in response to the stream of

        video image frames;

    classifying postures of the objects of interest in response to the feature information;

    obtaining standard object behaviors from a storage memory device; and

    characterizing ~~the~~ behaviors of the objects of interest in response to a comparison

        between the postures of the objects of interest and the standard object

        behaviors, wherein the characterizing the behaviors of the objects of interest

        further includes analyzing temporal ordering of ~~the~~ behavior primitives.

52. (currently amended) The method of claim 51, wherein the analyzing temporal ordering

of the behavior primitives further includes utilizing time-series analysis to identify a

transition from a previous behavior primitive to a next behavior primitive.

53. (currently amended) The method of claim 52, wherein the time-series analysis further includes employing Hidden Markov Models (HMMs).

54. (previously presented) The method of claim 51, wherein the providing feature information further includes tracking physical changes of the objects of interest over multiple video image frames.

55. (previously presented) The method of claim 51, wherein the identifying objects of interest from the stream of video image frames further includes detecting foreground objects of interest from the video image frames.

56. (previously presented) The method of claim 55, wherein the detecting foreground objects of interest further includes subtracting a background utilizing a background subtraction algorithm.

57. (previously presented) The method of claim 51, wherein the identifying objects of interest further includes identifying humans, vehicles, and other moving and non-moving objects.

58. (previously presented) The method of claim 51, wherein the identifying objects of interest further includes identifying an animal.

59. (previously presented) The method of claim 58, wherein the identifying an animal further includes identifying a biological mouse or rat.

60. (previously presented) The method of claim 51, wherein the classifying postures of the objects of interest further includes:

describing a sequence of postures as behavior primitives; and

aggregating behavior primitives to identify behaviors of the objects of interest over a plurality of video image frames.

61. (currently amended) The method of claim 60, wherein the ~~identifying~~ classifying of postures of the objects of interest includes detecting the shapes of the objects of interest.

62. (currently amended) The method of claim 51, wherein the characterizing the behaviors of the objects of interest further includes identifying one of eating, rearing, jumping, drinking, running, walking, chewing, grooming, hanging, cuddling, landing vertically, repetitively jumping, circling, sleeping, twitching, awakening, digging, foraging, sniffing, pausing, urinating, stretching, licking, scratching, spinning, sitting, standing, and lying ~~of the objects of interest~~.

63. (currently amended) The method of claim 51, wherein the identifying ~~an~~ objects of interest further includes detecting one of vertical position side view, horizontal position side view, vertical position front view, horizontal position front view, and moving of the objects of interest.

64. (currently amended) An apparatus for characterizing an activity comprising:

 means for obtaining a stream of video image frames from a monitoring device;

 means for identifying objects of interest from the stream of video image frames;

 means for providing feature information of the objects of interest in response to the stream of video image frames;

 means for classifying postures of the objects of interest in response to the feature information;

 means for obtaining standard object behaviors from a storage memory device; and

 means for characterizing ~~the~~ behaviors of the objects of interest in response to comparison between the postures of the objects of interest and the standard object behaviors; wherein the means for characterizing further includes means for analyzing temporal ordering of ~~the~~ <u>behavior</u> primitives using transitional information from a previous behavior primitive to a next behavior primitive; wherein the means for analyzing temporal ordering of ~~the~~ <u>behavior</u> primitives further includes means for utilizing Hidden Markov Model time-series analysis.

65. (previously presented) The apparatus of claim 64, wherein the means for providing feature information further includes means for tracking physical changes of the objects of interest over multiple video image frames.

66. (previously presented) The apparatus of claim 64, wherein the means for identifying objects of interest from the stream of video image frames further includes means for detecting foreground objects of interest from the video image frames.

67. (previously presented) The apparatus of claim 66, wherein the means for detecting foreground objects of interest further includes means for subtracting a background utilizing a background subtraction algorithm.

68. (currently amended) The ~~method~~ apparatus of claim 64, wherein the means for identifying objects of interest further includes means for identifying humans, vehicles, and other moving and non-moving objects.

69. (previously presented) The apparatus of claim 64, wherein the means for identifying objects of interest further includes means for identifying an animal.

70. (previously presented) The apparatus of claim 69, wherein the means for identifying an animal further includes means for identifying a biological mouse or rat.

71. (previously presented) The apparatus of claim 64, wherein the means for classifying postures of the objects of interest further includes:

      means for describing a sequence of postures as behavior primitives; and

      means for aggregating behavior primitives to identify behaviors of the objects of interest over a plurality of video image frames.

72. (currently amended) The apparatus of claim 71, wherein the means for ~~identifying~~ classifying of postures of the objects of interest includes means for detecting shapes of the objects of interest.

73. (currently amended) The apparatus of claim 64, wherein the means for characterizing the behaviors of the objects of interest further includes means for identifying one of eating, rearing, jumping, drinking, running, walking, chewing, grooming, hanging, cuddling, landing vertically, repetitively jumping, circling, sleeping, twitching, awakening, digging, foraging, sniffing, pausing, urinating, stretching, licking, scratching, spinning, sitting, standing, and lying ~~of the objects of interests~~.

74. (previously presented) The apparatus of claim 64, wherein the means for identifying objects of interest further includes means for detecting one of vertical position side view, horizontal position side view, vertical position front view, horizontal position front view, and moving of the objects of interest.

75. (currently amended) A machine-readable medium having stored thereon computer executable instructions, which cause a digital processing system to perform a function, the function comprising:

    obtaining a stream of video image frames from a monitoring device;

    identifying objects of interest from the stream of video image frames;

    providing feature information of the objects of interest in response to the stream of video image frames; -

    classifying postures of the objects of interest in response to the feature information;

obtaining standard object behaviors from a storage memory device; and

characterizing ~~the~~ behaviors of the objects of interest in response to comparison

between the postures of the objects of interest and the standard object

behaviors, wherein the characterizing the behaviors of the objects of interest

further includes analyzing temporal ordering of ~~the~~ <u>behavior</u> primitives.

76. (currently amended) The machine-readable medium of claim 75, wherein the analyzing

temporal ordering of the <u>behavior</u> primitives further includes utilizing time-series analysis to

identify a transition from a previous behavior primitive to a next behavior primitive.

77. (currently amended) The machine-readable medium of claim 76, wherein the time-series

analysis further includes employing Hidden Markov Model<u>s</u> (HMMs).

78. (previously presented) The machine-readable medium of claim 75, wherein the

providing feature information further includes tracking physical changes of the objects of

interest over multiple video image frames.

79. (previously presented) The machine-readable medium of claim 75, wherein the

identifying objects of interest from the stream of video image frames further includes

detecting foreground objects of interest from the video image frames.

80. (previously presented) The machine-readable medium of claim 79, wherein the detecting

foreground objects of interest further includes subtracting a background utilizing a

background subtraction algorithm.